PS-05-0907-11

TF agreed on recommending requirements for the quasi-static performance load case as stated in APTA SS-C&S-034-99 Rev.1, Standard for the Design and construction of Passenger Railroad Rolling Stock, Dated August 10, 2005 Section 5.3.1.3.1 Cab-end collision posts (49 CFR238.211 b) and 5.3.2.3.1 Cab end corner posts.

NOTE: Adoption of this standard supersedes some of requirements in the CFR, FRA will resolve these differences when drafting the NPRM.
TF will review NPRM at future meeting.

Passenger Equipment Crashworthiness Task Force

Passenger Safety Working Group

September 7, 2005

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Overview

- Development of Cab Car End Frame Optimization standards
- Cab Car End Frame Tests
- Adoption of Standard
- Action Items
- Issues identified regarding test protocol
- Recommendations from Working Group

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Development of Cab Car End Frame Optimization standards

- Consensus on Fundamental Technical Requirements
- Consensus on Recommended "Home" for Standards
  - Dynamic Standard
    - FRA Regulation
  - Quasi-Static Standard
    - APTA Standard
  - Approach Parallels FRA's NPRM/AAR S-580
- Consensus Achieved on Values for Energy Absorption
- Consensus not yet achieved for Dynamic Standard

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Cab Car End Frame Tests

- Quasi-Static Tests to Help Define APTA Standard
  - M-7 Collision Post (Completed, Bombardier)
  - M-7 Corner Post (Planned, Bombardier)
  - SOA Corner Post (Tentatively Planned, FRA)
  - TBD Collision Post (Tentatively Planned, FRA)
- Dynamic Tests to Help Define Recommendations for FRA Regulation
  - 1990's Corner Posts (Completed, FRA)
  - SOA Corner Posts (Completed, FRA)
  - TBD Collision Post (Tentatively Planned, FRA)

4

Overview of Draft Cab Car End Frame Standards

- Dynamic Standard
  - Cab Car Impact with Rigid Object with Prescribed Initial Locations, Weights and Impact Speed
  - Criterion: No More Than 10 Inches Deformation of Collision/Corner Post
- Quasi-Static Standard
  - Corner/Collision Post Severely Deformed for Load Applied 30 Inches Above Deck
  - Criteria
    - Minimum Prescribed Energy Absorbed
    - No More Than 10 Inches Deflection of Collision/Corner Post into Operator's Cab
    - No Complete Separation of Attachments

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Adoption of Standard

- Adoption of this standard supersedes some of requirements currently in the CFR
  - FRA will resolve these differences when drafting the NPRM
- TF will review draft text for the NPRM at future meeting
- FRA and APTA have concerns related to the dynamic test
  - TF could not agree on inclusion of the dynamic performance load case
    - FRA desires the dynamic performance load case, APTA does not

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Action Items

- FRA agreed that the values used in the August 10th APTA Standard are numbers that could also be used in the Dynamic Test
- FRA will do a dynamic test, paying the cost, using state of the art model
  - Up until now all values have been derived from analysis modeling

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Issues identified regarding test protocol

- FRA wants the Dynamic Test included as an option to the Static Test
  - FRA stated that the Dynamic is a performance standard, contending that the static test is more prescriptive and could possible restrict development of new equipment
  - Also, the static test is not appropriate for nose type designs and other configurations that exist or are in development
- APTA opposed the inclusion of the Dynamic Test as an option
  - They stated it will add cost and, without a test performed using a "production model design", they believe the numbers are good as presented by FRA for the Dynamic Test but are not completely comfortable

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Issues identified regarding test protocol

- Additionally, APTA believes that if dynamic testing is an option, customers when ordering cars will request both tests with the advice of a consultant
  - It will require an actual car be used increasing cost, if the test would happen to fail, then a second car would also have to be used to repeat the test, doubling cost
- For the additional Dynamic Test that FRA has offered to conduct and pay for, APTA members objected to the use of SOA design instead of a production model

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Recommendations from
Working Group

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EXCERPT FROM *DRAFT* PASSENBER SAFETY WORKING GROUP MINUTES

Facilitator Gross asks Gary Fairbanks (FRA–Office of Safety) for a report on Passenger Equipment Crashworthiness TF activities.

Gary Fairbanks (FRA) uses a series of Microsoft PowerPoint presentations, projected onto a screen. Photocopies of the Microsoft PowerPoint viewgraphs were distributed to meeting attendees as Meeting Document PS-05-0907-09. All meeting handouts will be accessible on the WG Internet Web Site and are not excerpted in their entirety in the WG Minutes. Under the viewgraph, "Overview," Mr. Fairbanks says his presentation will include: (1) development of cab car end frame optimization standards; (2) cab car end frame tests; (3) adoption of standard; (4) action items; and (5) issues identified regarding test protocol. Under the viewgraph, "Development of Cab Car End Frame Optimization Standards," Mr. Fairbanks says the TF has reached consensus on fundamental technical requirements. In addition, the TF has reached consensus on the recommended "home" for the standards–the dynamic standard will be through FRA regulation; the quasi-static standard will be the APTA standard. The TF has also reached consensus on values for energy absorption. However, the TF has not reached consensus for the dynamic standard. Under the viewgraph, "Cab Car End Frame Tests," a series of quasi-static tests, i.e., M-7 collision post, M-7 corner post, state of the art (SOA) corner post, etc., are helping to define the APTA Standard with the following criteria: minimum prescribed energy absorbed; no more than 10-inches deflection of collision/corner post into operator's cab; and no complete separation of attachments. A series of dynamic tests, i.e., 1990's corner posts, SOA collision posts, etc., are helping to define recommendations for FRA regulation with the following criterion: no more than 10-inches deformation of the collision/corner post. Under the viewgraph, "Adoption of Standard," Mr. Fairbanks says that adoption of the APTA Standard will supersede some of the requirements currently in the CFR. FRA will resolve these differences when drafting the NPRM. FRA and APTA have concerns related to the dynamic test–FRA desires the dynamic performance load case; APTA does not. Under the viewgraph, "Action Items," Mr. Fairbanks says that FRA agrees that values used in the August 10, 2005, APTA Standard are numbers that could also be used in the dynamic test. FRA will do a dynamic test, paying the cost, using a state of the art (SOA) model. Under the viewgraph, "Issues Identified Regarding Test Protocol," Mr. Fairbanks says that FRA wants the Dynamic Test included as an option to the Static Test. FRA believes that a dynamic test is a performance standard, adding that a static test is more prescriptive and could possibly restrict development of new equipment. Also, the static test is not appropriate for nose-type designs and other configurations that exist or are in development. APTA opposed the inclusion of the Dynamic Test as an option. APTA says the dynamic test will add cost and, without a test performed using a "production model design," APTA will not be comfortable with the results of the dynamic test. Additionally, APTA believes that if dynamic testing is an option, customers, when ordering cars, will request both tests. Because a slight variation in speed and other variables can alter the dynamics of crashworthiness, and because of the difficulty in maintaining these variables in a dynamic test, APTA believes dynamic tests will need to be repeated, adding to the cost of acquiring passenger equipment.

Gary Fairbanks (FRA) asks for questions.

Thomas Peacock (APTA) asks why FRA is not specifying testing standards.

Mr. Fairbanks responds that FRA wants to provide options to the industry and its customers.

Larry Kelterborn (APTA) says the passenger car industry has reservations about FRA testing a SOA design because none of the car builders contemplates using a SOA design.

David Tyrell (Volpe) say the SOA design has been fully discussed and fully described.

Larry Kelterborn (APTA) believes a prototype SOA design may perform differently than designs currently under manufacture.

Grady Cothen (FRA) says the TF has approved a static test for cab car end frame designs. He understands that APTA will complete its tests and then FRA will adopt the APTA Standards. He says the issue before the WG is whether the WG wants to proceed with this process for a rulemaking. Several months ago, the Locomotive Crashworthiness WG completed a task for crashworthiness standards for freight locomotives. He asks if FRA can provide a further assistance in this matter to the passenger area?

Thomas Peacock (APTA) expresses his concerns. He says the performance option will allow weaker performance standards for collision posts and corner posts. He believes the APTA Standard will provide a greater amount of safety for people standing behind the collision posts and corner posts than the performance standard.

Robert McCown (AAPRCO) asks what makes that so? Is it the test method? Is it the performance method?

Robert Harvey (BLET) says a performance standard needs to describe what is being protected. He does not need a performance standard for a collision post if he is standing in a corner.

Gary Fairbanks (FRA) believes that Mr. Peacock is trying to say that a dynamic standard is not the "safety-equivalent" of a quasi-static standard. FRA believes that a dynamic standard is the "safety-equivalent" of a quasi-static standard.
Rich Stegner (APTA) says a dynamic impact test is not repeatable. There are too many variables. From his perspective, he prefers a quasi-static test is a performance-based test that is based on dynamic testing. He says that at the Transportation Technology Center in Pueblo, Colorado, the Federal government can conduct dynamic tests. But from a safety and insurance standpoint, General Motors Corporation's Electro-Motive Division cannot perform dynamic tests.

Thomas Peacock (APTA) adds that in the past five years, major rail car manufacturers have been forced out of business by the inability to do performance tests. It is very difficult to keep all the variables standard. An increase in vehicle speed could greatly increase the amount of energy in an accident. If a manufacturer fails a dynamic test because of a 1 mile-per-hour (mph) overspeed, it will be very costly to re-test. Gary Fairbanks (FRA) says when car manufacturers put in their "bid" to supply equipment, it can be based on either the dynamic test or the quasi-static test.

Al Bieber (APTA) says rail equipment manufacturers want to build cars to railroad specifications and regulations. Car builders do not do "alternate designs." He asks what future designs does FRA envision for rail cars?

Grady Cothen (FRA) explains there may be car designs not yet available that might be better than what is in use today. FRA should allow for the possibility of new passenger car designs. FRA is not trying to force any particular design on the industry. Considering the time that Federal regulations remain in force, Mr. Cothen believes it is reasonable to craft regulations that allow for change.

Larry Kelterborn (APTA) says at the last Passenger Equipment Crashworthiness TF meeting, each of the three car builders said they did not want dynamic testing standards. The railroads expressed the same. In dynamic testing, an impact scenario can be crafted such that collision post deformation results are only valid for that test. If a dynamic test is required, there can be problems with safety–the bigger the locomotive or cab nose, the more likely a derailment will occur.

David Tyrell (Volpe) asks what is the danger of a dynamic test?

Mr. Kelterborn responds designing a test where the car will derail, or roll over on its side is not safe.

Mr. Tyrell responds that he believes that quasi-static testing can be more dangerous than dynamic testing.

Ken Mannen (APTA) says Kawasaki Rail Car has crashed a full car shell, which passed a dynamic test.

William Verdeyen (BLET) asks how Bombardier performs a quasi-static test on a passenger car?

Mr. Kelterborn describes the Bombardier quasi-static test procedure.

Mr. Verdeyen (BLET) says in the AAR's S-580 locomotive crashworthiness standards, a survivable area of 24 inches was achieved. He asks if a "survivable area" can be measured in quasi-static testing?

Rich Stegner (APTA) responds yes, it can be measured.

Mr. Kelterborn says anytime there is a severe deformation test, there are safety issues. He says there is more control over a quasi-static test, than a dynamic test. A quasi-static test can be stopped. He believes the dynamic test option being proposed by FRA is not realistic. If the test vehicle is 1 mph over the speed "standard," there will be a lot of test failures. He does not want the regulations to allow the dynamic testing option. He believes the regulations should only require quasi-static testing.

David Elliott (APTA) believes there should be "physical validation" of design in order to meet requirements.

Grady Cothen (FRA) says FRA wanted to provide guidance. FRA has things to think about, including dynamic testing. He believes that the WG should recommend that FRA adopt the APTA Standard for passenger equipment crashworthiness, when it is available.

Facilitator Gross asks for a motion to approve the Passenger Equipment Crashworthiness TF recommendation regarding adopting the APTA Standards for passenger equipment crashworthiness, i.e., APTA SS-C&S-034-99 Rev. 1, Standard for the Design and Construction of Passenger Railroad Rolling Stock, Dated August 10, 2005, Section 5.3.1.3.1 Cab-end collision posts (49 CFR § 238.211(b) and 5.3.2.3.1 Cab end corner posts, when available. The recommendation was distributed to meeting attendees as Meeting Document PS-05-0907-11. All meeting handouts will be accessible on the WG Internet Web Site and are not excerpted in their entirety in the WG Minutes.

> BY UNANIMOUS HAND VOTE, THE WG APPROVES THE PASSENGER EQUIPMENT CRASHWORTHINESS TF RECOMMENDATION THAT FRA ADOPT APTA STANDARDS FOR QUASI-STATIC TESTING OF PASSENGER EQUIPMENT CRASHWORTHINESS, WHEN AVAILABLE.